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ORANGEBURG UNDERFLOOR DUCT SYSTEM



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ORANGE BURG
UNDEVELOPED
DUCT SYSTEM



ORANGEBURG

PERMANENCY
APPEARANCE
FLEXIBILITY
CAPACITY
ECONOMY



Patented

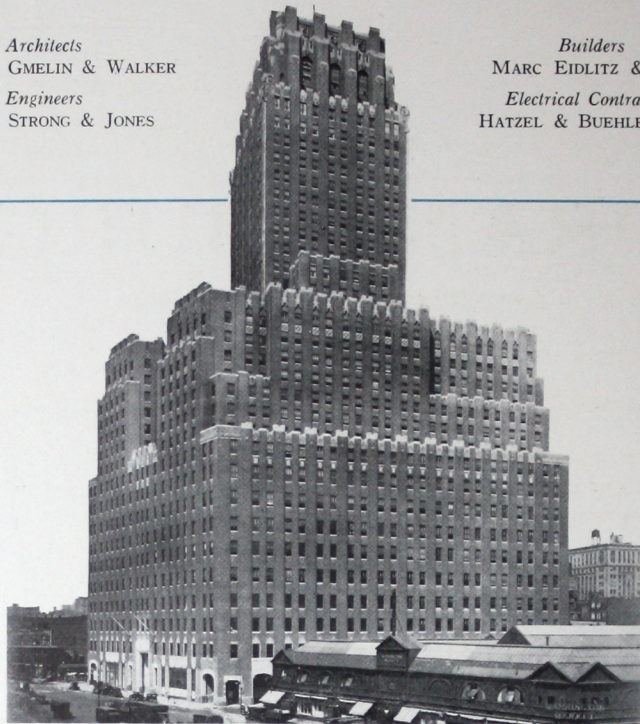
March 17, 1925

UNDERFLOOR DUCT SYSTEM

Approved by National Electrical Code and Underwriters' Laboratories

Architects
VOORHEES, GMLIN & WALKER
Engineers
MEYER, STRONG & JONES

Builders
MARC EIDLITZ & SON
Electrical Contractors
HATZEL & BUEHLER, INC.



NEW YORK TELEPHONE CO.—HOME OFFICE BUILDING
NEW YORK CITY

The Orangeburg Underfloor Duct System

WITH a steadily increasing use of telephone and communicating systems and a very great increase in the use of electrically operated business machines, the wire distribution system of the modern office building must not only meet all initial demands for electrical service, but must also provide for future increases and changes.

Prior to the development of the underfloor duct system, the most common type of distributing system consisted of iron conduits run in the floor to the walls, columns, and predetermined locations in the floor of the building. A system of this type provides neither adequate

coverage of usable floor area nor for changed requirements. Experience has shown that it is necessary to provide many additional outlets, not only during the construction of the building, but from time to time in the future. Such additional outlets are expensive and, furthermore, the many unsightly expedients resorted to in the past in order to make wire connections would not be tolerated in the present-day office building.

It was with a view towards improving the then existing methods of wire distribution that the first underfloor duct system was conceived and developed eight years ago. This first

system has become known as the Orangeburg Underfloor Duct System, and, generally, consists of a network of ducts embedded in the concrete floor. These ducts are laid in parallel lines throughout the usable floor area and are fed by header ducts across and connected to the parallel ducts by junction boxes. Wire connections to desks or other equipment are made at any point by tapping the ducts. Such a system meets the requirements of flexibility.

As the underfloor duct system was developed primarily to provide for future increases and changes in electrical service, the capacity and permanency of the materials composing such a system is a most important consideration.

The Orangeburg underfloor ducts, made in various sizes, have a cross-sectional area ranging from $2\frac{1}{4}$ to 6 square inches. With the larger sizes, large lead-covered cables, such as used by the telephone companies, can be pulled in the ducts. Junction boxes are designed to give ample wiring space and ease of pulling.

The ducts composing the Orangeburg Underfloor Duct System are made of the same material as the well-known Orangeburg fibre conduit, many million feet of which have been used by public utility companies in underground construction for the past thirty years. The resistance of this material to moisture, electrolysis and chemical action has been proved. It can readily be seen that the future utility of a ductway corroded by moisture or chemical action from the cinder fill is practically nullified. Junction boxes and other fittings composing the system are ruggedly made of cast iron and brass.

By combining the facilities afforded by an underfloor duct system in general with the advantages of fibre ducts in particular, the Orangeburg Underfloor Duct System offers:

FLEXIBILITY—Ducts serve all floor space, and outlets may be placed exactly where desired at any time.

PERMANENCY—Ducts are unaffected by moisture or chemical action and will last for the life of the building.

CAPACITY—Large-sized ducts allow for future increase and permit the use of large lead cables.

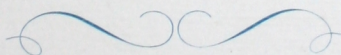
APPEARANCE—Wires are hidden from view. Junction box covers and outlet fittings are so made that linoleum flooring is not damaged in removing box covers or in making outlet connections.

ECONOMY—An Orangeburg Underfloor Duct System is the most economical method of wire distribution on the market.

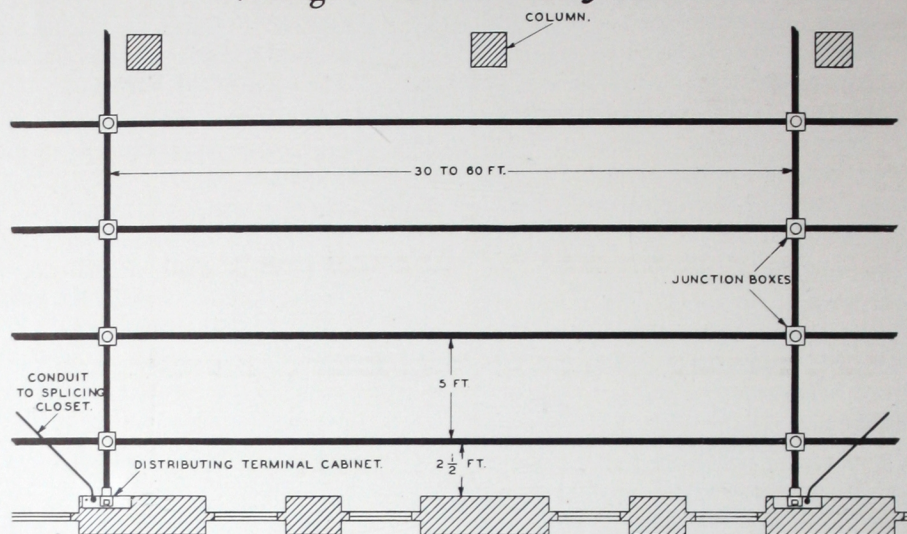
Expense of establishing additional outlets is negligible.

The success with which the Orangeburg Underfloor Duct System has met the requirements of the modern commercial building is best attested by the fact that millions of feet of duct are now in use and hardly an up-to-date building is planned today without an underfloor duct system included as a very necessary facility. No small measure of the success of the Orangeburg Underfloor Duct System can be attributed to the telephone and public utility companies, who, both by the use of the system in their own buildings and by recommendation to owners, architects and engineers, have furthered its use.

In planning an underfloor duct system, it is important to take into consideration the requirements of the specific building and we are prepared to offer complete information and assistance in making layouts to meet the particular requirements. Various typical layouts, together with descriptions and illustrations of the equipment making up the Orangeburg Underfloor Duct System, are shown on the following pages.

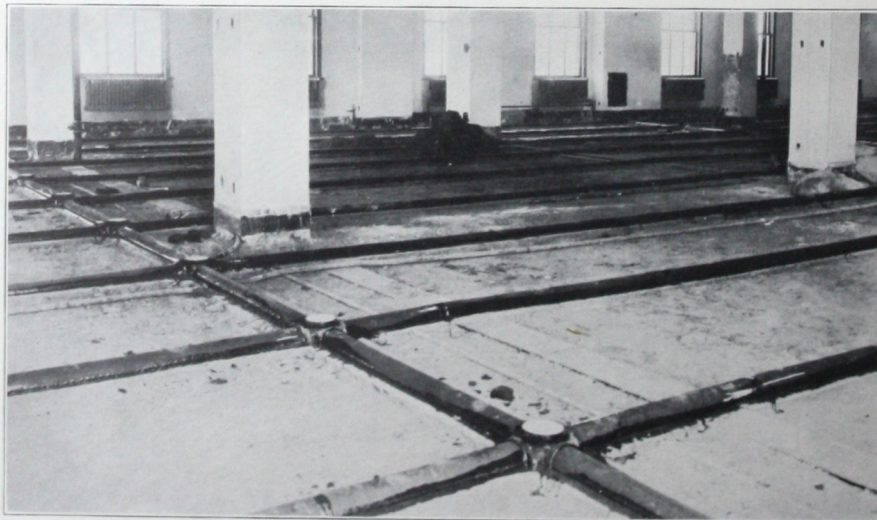


Single Grid Layout

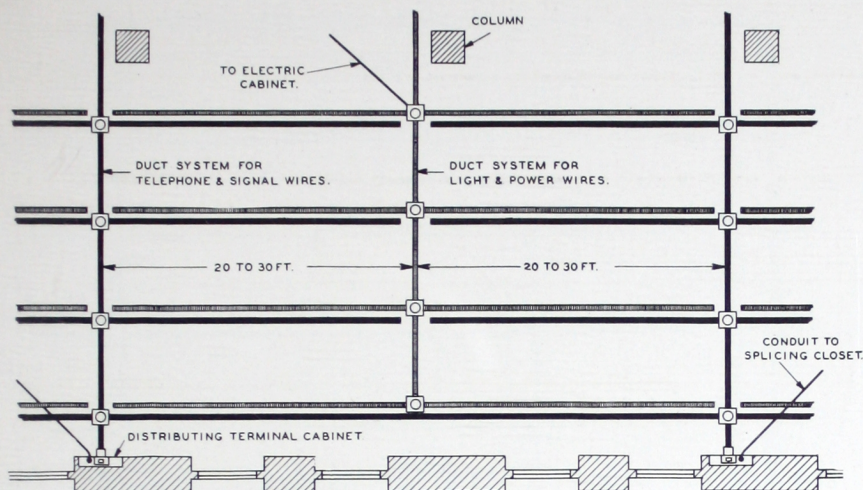


THE layout of a single duct system for power and lighting, or for telephone and signal distribution, is that of the familiar grid. The first line of duct is generally placed $2\frac{1}{2}$ to 3 feet from the outer wall. The paralleling ducts are placed at a uniform distance from the first line of duct. This distance of course may vary to meet the requirements of the specific building, but a distance of 5 feet

will give full coverage to all space and is the one most generally used. Junction boxes are generally spaced thirty to sixty feet apart depending on estimated density of wiring. If a high tension system, headers are fed by conduit from electric cabinet or from base receptacles on walls or columns. If a low tension system, headers are connected to wall cabinets with duct and wall elbows.

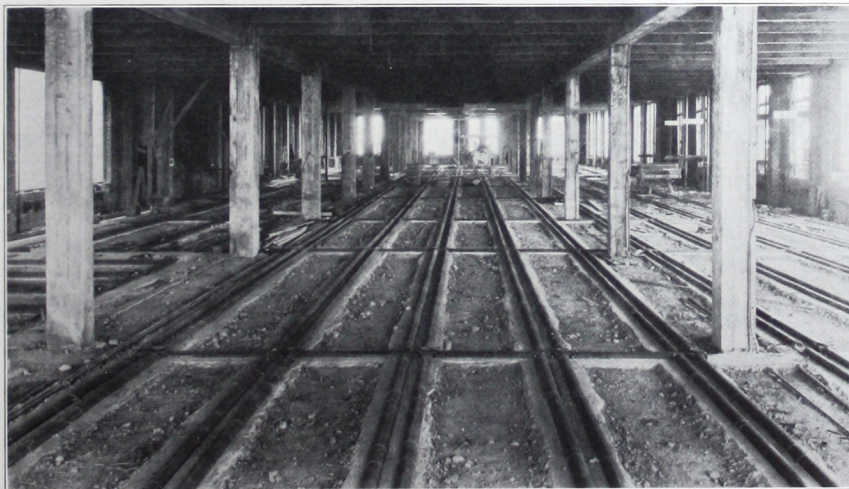


Interlocking Comb Layout

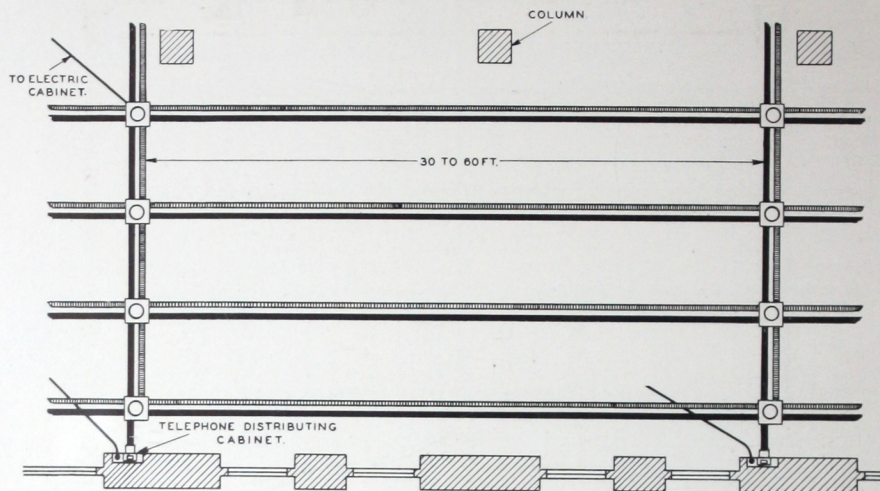


WHERE both high and low tension service is to be provided, separate ducts and junction boxes for each service are installed. The same general plan of making a single grid layout applies to this type of layout. With a layout of this type alternate headers are used for high and low tension systems respectively.

High tension headers are fed by conduit from electric cabinet or from base receptacles on walls or columns. Low tension headers are fed by duct to wall cabinets. As a separate junction box is used for each class of service, maximum wiring space is provided. Boxes of this type permit the use of large lead covered cables.

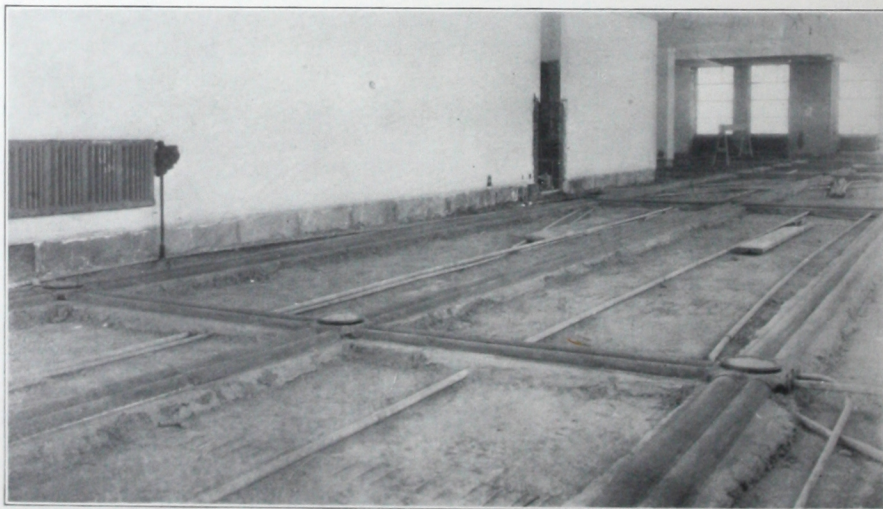


Double Grid Layout

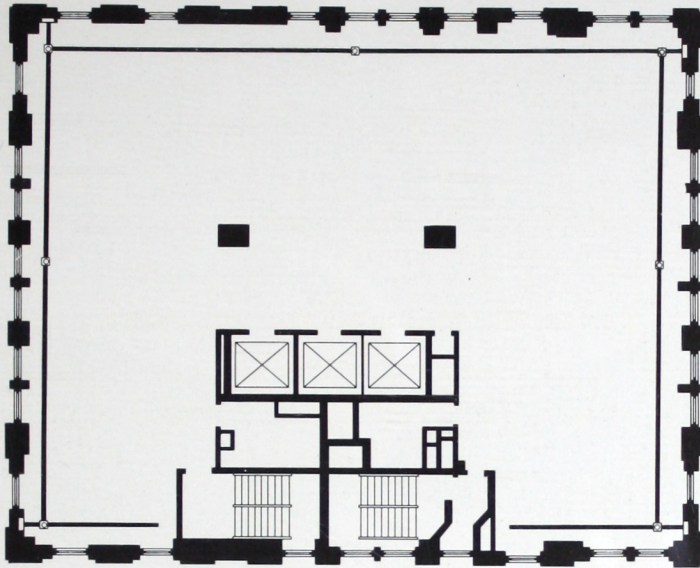


A LAYOUT of this type embodies the same features as the Interlocking Comb, except that both high and low tension ducts enter the same junction box. The box is divided by tunnels and baffles

into two separate wiring compartments. A box of this type does not afford the area and ease of pulling cable that is provided by the single compartment box as used in the Interlocking Comb layout.



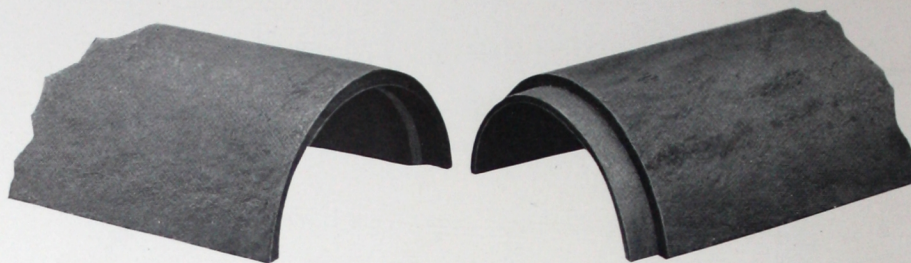
Runaround Layout



A LAYOUT of this type consists of either a single or double line of duct placed 3 to 5 feet from the outer wall of the building. While providing only a minimum of coverage, this layout will meet

the heavy demands for service around the outside walls of the building. On account of its flexibility and economy, this type of layout is replacing corridor and base mouldings for wire distribution.

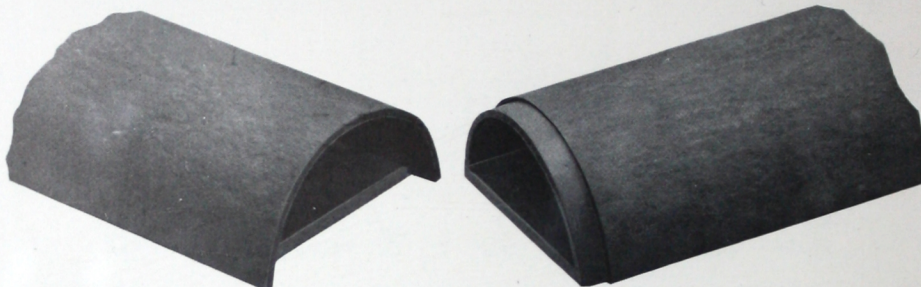




Fibre Duct—Open Bottom Type

Furnished in 5 foot lengths and in sizes ranging from $1\frac{1}{2}$ " to $2\frac{1}{4}$ " high, outside dimensions. Cross sectional area of ducts ranges from $2\frac{1}{4}$ to 6 square inches. Ducts of this type are in-

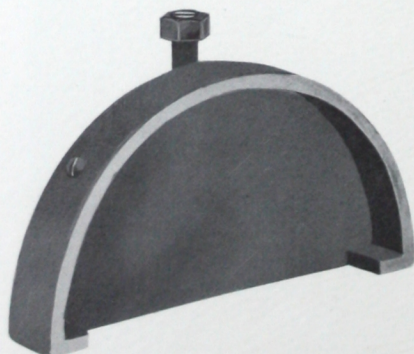
stalled on a concrete pad laid on the floor slab and are secured in place by pouring hot compound along the edges. Installation of ducts of this type is shown on page 15.



Fibre Duct—Closed Bottom Type

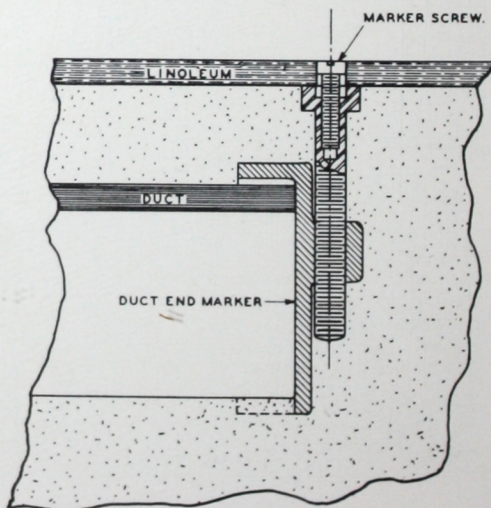
Furnished in 5 foot lengths and in sizes ranging from $1\frac{1}{2}$ " to $2\frac{1}{4}$ " high, outside dimensions. Cross sectional area of ducts ranges from $2\frac{1}{4}$ to $5\frac{1}{4}$ square inches. Ducts of this type are used principally in floors of monolithic construc-

tion. Ducts are placed on supports which are fastened to wood forms or I beams. Installation of ducts of this type is shown on page 14. If closed bottom ducts are used in floors with a fill it is not necessary that the ducts be laid on a concrete pad.



Duct End Marker

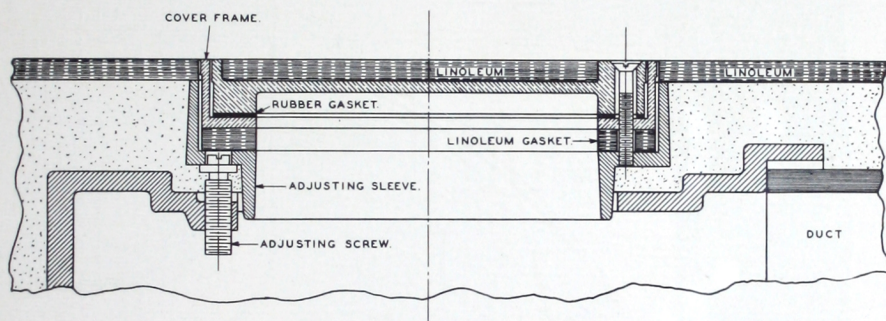
Cast iron fitting for closing and marking dead end of duct line.





Junction Box Single Compartment Type

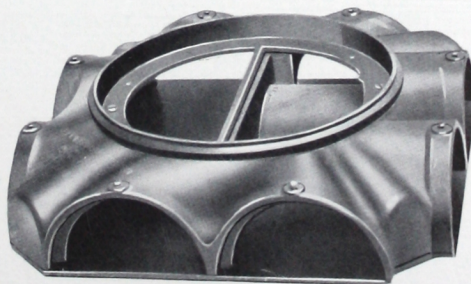
Junction boxes are made of cast iron and brass and are fitted with elevating mechanism to insure exact leveling with floor surface. Recessed covers are provided for any type of flooring. Box corners can be drilled for iron conduit when desired. This type of box is used in Single Grid, Interlocking Comb and Runaround layouts.



Junction Box Double Compartment Type

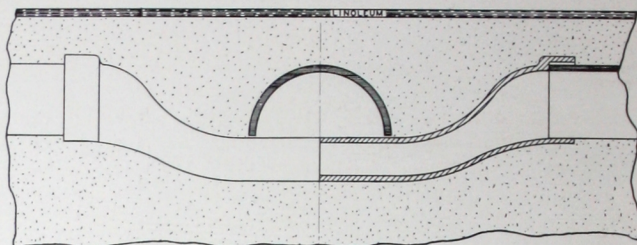
This type of box is similar to Single Compartment Type except wiring space is divided into two compartments, one for low tension and the other for high tension service. This type of box is used in Double Grid and Runaround layouts.

Detail of cover assembly of both Single and Double Compartment Type boxes is shown in above drawing.



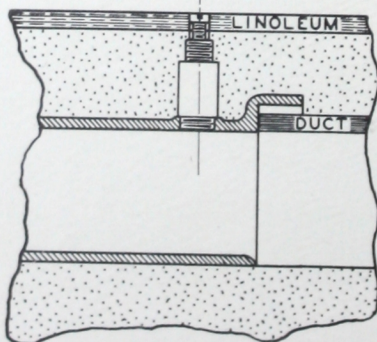
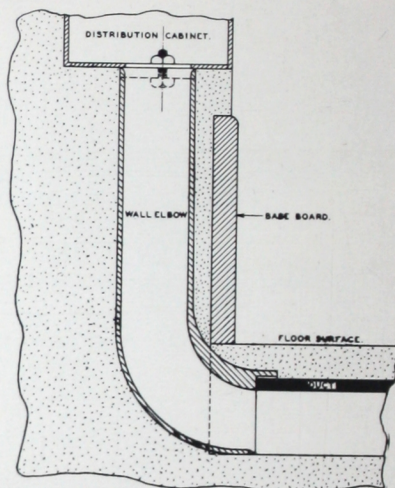
Crossunder

Made of cast iron and used to offset an underfloor duct to allow the crossing of another duct or iron conduit.



Wall Elbow

Made of cast iron and used to connect header ducts with wall cabinets.



Floor Elbow

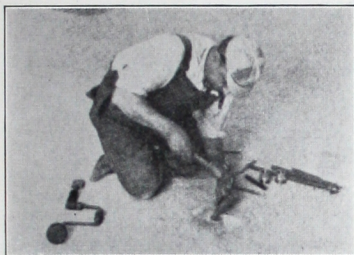
Floor elbows are made of cast iron and furnished in 45 and 90 degrees. Floor elbows are occasionally used at corners instead of junction boxes. Each elbow is provided with two screws in order to mark location of elbow in the floor.

Floor Outlets

IN the Orangeburg Underfloor Duct System, it is not necessary to lay out the office furniture plan until very shortly before the quarters are to be occupied. Outlets and wire connections are then made at the exact locations desired. To establish an outlet is both a very simple and inexpensive procedure.

followed, except that, after the line of duct is located, a circular opening is cut in the linoleum to accommodate a flange which is afterward screwed into the insert. Tools for cutting linoleum to exact diameter of flange are furnished by the manufacturer.

For an outlet through wood flooring, a hole,



(1) Cutting through the concrete



(2) Cutting through the duct

To place an outlet in a cement floor a line is drawn between the centers of junction box covers to locate the ducts.

1—With a $\frac{1}{2}$ " flat chisel, a two-inch circular opening is cut down to the top of the duct.

2—The duct is then cut with a special cutter, supplied by the manufacturer, which fits in any common brace. This cutter is equipped with an automatic stop, so that, after cutting through the duct, there will be no possibility of abraiding any wires that may be in the duct-way.

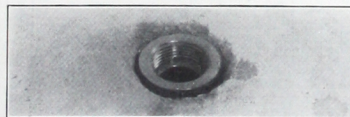
3—With a wrench, also supplied by the manufacturer, the insert is screwed into the top of the duct. The top of the insert should be flush with the floor level.

4—The insert is then well grouted in with cement. It is recommended that a mixture of Portland cement and sand be used. Plaster of Paris should not be used.

For concrete floors with linoleum or other similar floor covering, the same procedure is



(3) Screwing in the insert



(4) Note how little grouting is necessary afterward

2" in diameter is bored through the flooring and a counter bore $3\frac{1}{2}$ " in diameter and $\frac{5}{32}$ " deep is made to accommodate a supporting flange which is secured to floor by means of four wood screws. The cutting of the concrete under the wood flooring and placing of the insert in the duct follows the same procedure as previously described.

All outlet fittings in the Orangeburg System are made of brass to resist corrosion and are designed to serve as rugged and watertight wire outlets.

By means of previously described flange, linoleum or other similar floor covering is not marred in making outlet, and outlet can be subsequently abandoned without making it necessary to patch the floor covering. Drawing on page 12 illustrates the advantages of this exclusive feature of the Orangeburg System.



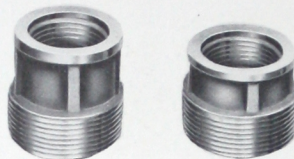
Inserts for Wood Floors

Made of brass and adjustable to various heights. Flange is countersunk in wood floor and held in position with screws.



Cable Insert

Made of cast iron with brass cover. Adjustable to various heights. Cover plate can be drilled for any size riser up to $1\frac{1}{2}$ ". Used principally for large telephone cables.



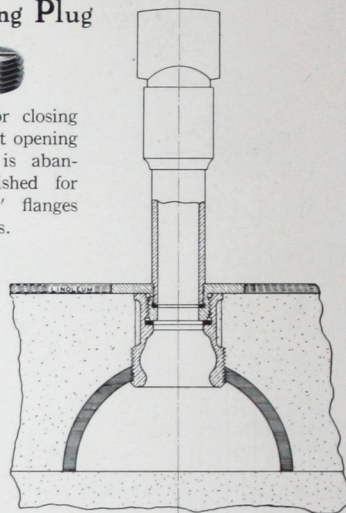
Inserts for Concrete Floors

Made of brass and furnished in heights for concrete over the duct ranging from $\frac{3}{4}$ " to 6". Inserts have a throat opening of 1" I. P. S.

Abandoning Plug

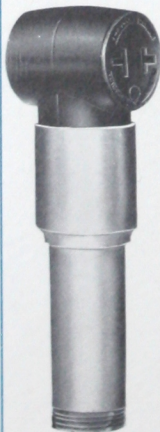


Brass plug for closing flange or insert opening when outlet is abandoned. Furnished for $\frac{1}{2}$ " and $\frac{3}{4}$ " flanges and 1" inserts.



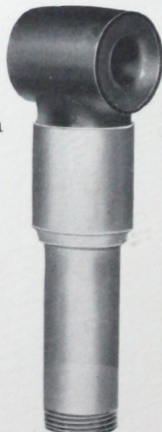
Flange for Linoleum Flooring

Furnished in a brushed brass finish. For use with linoleum, cork, rubber tile or other similar flooring laid over concrete. Furnished with openings for $\frac{1}{2}$ " and $\frac{3}{4}$ " risers.



High Tension Outlet

Riser and coupling furnished in brushed brass finish. Double insertion disconnect head is made of bakelite. Furnished with $\frac{1}{2}$ " and $\frac{3}{4}$ " risers.



Double Low Tension Outlet

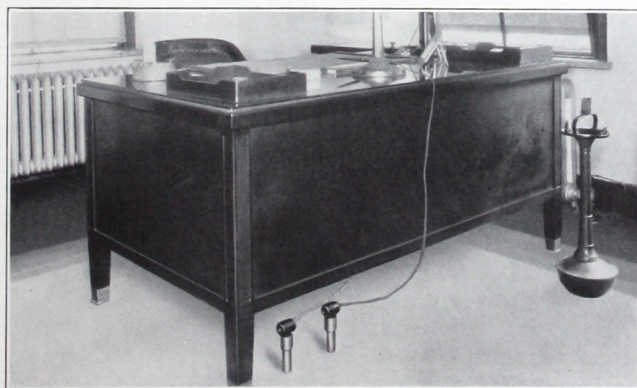
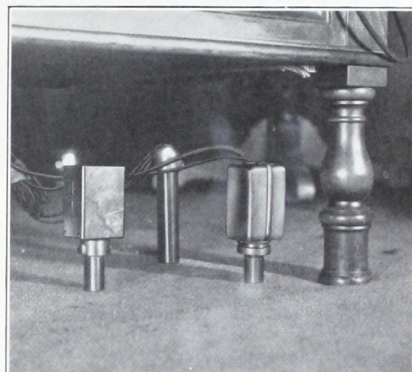
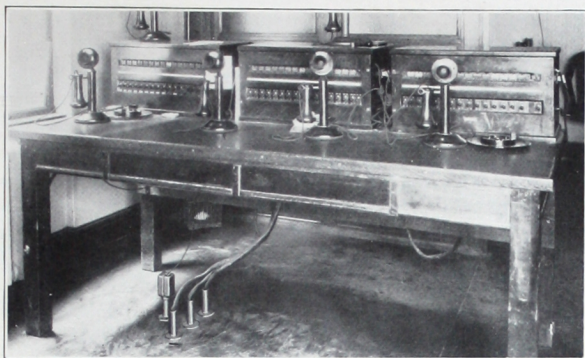
Riser and coupling furnished in brushed brass finish. Head is made of bakelite. Furnished with $\frac{1}{2}$ " and $\frac{3}{4}$ " risers.



Single Low Tension Cap

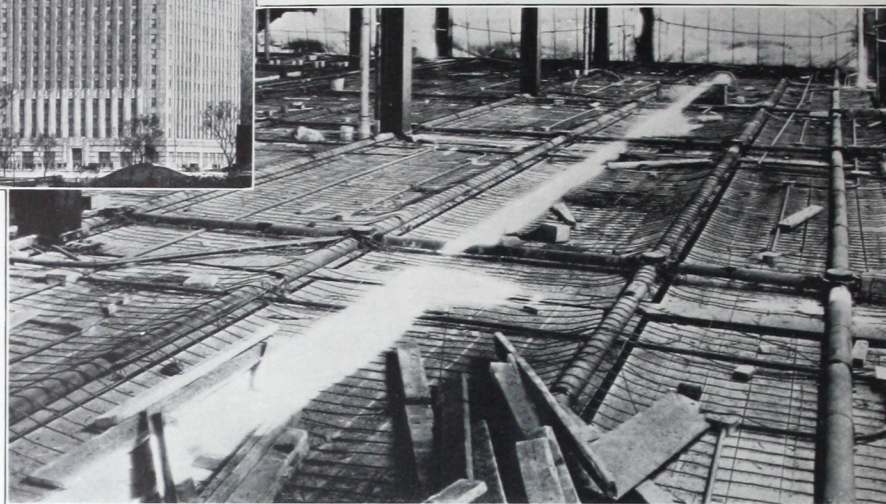
Riser and cap furnished in brushed brass. Risers can be supplied separately. Caps are furnished for $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" risers.

Examples of Service Requirements

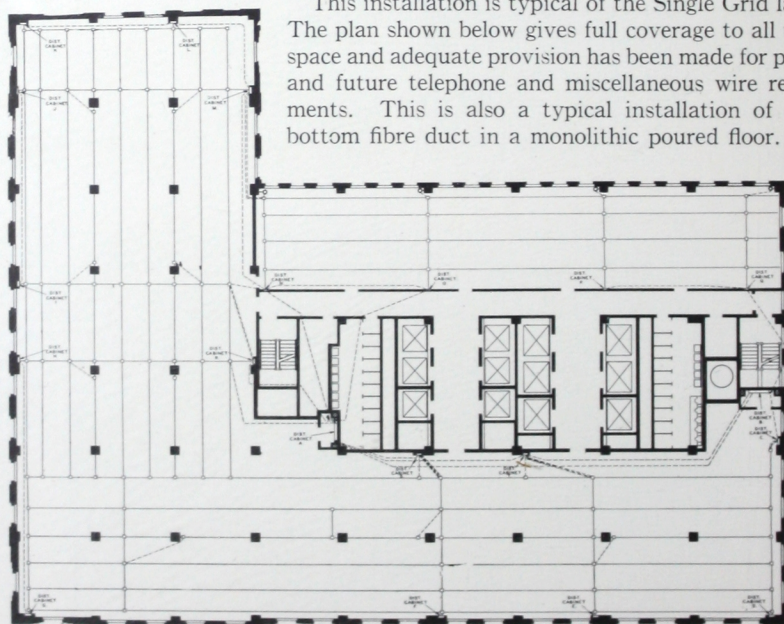




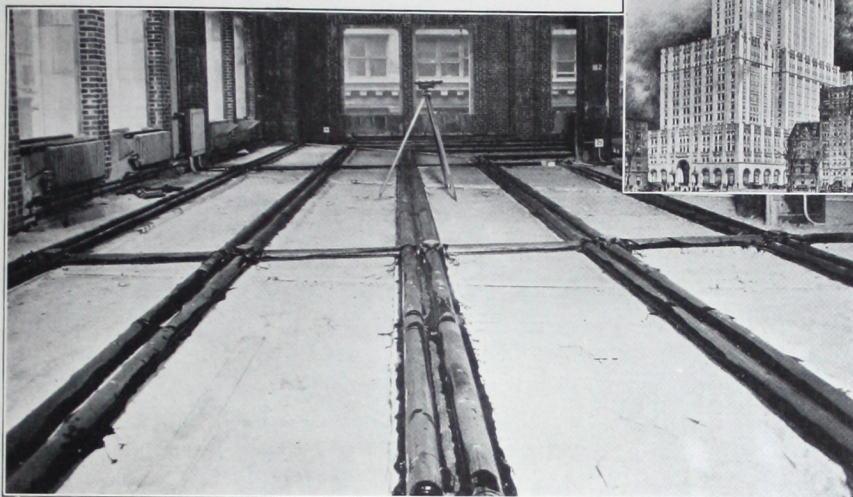
NEW JERSEY BELL TELEPHONE CO., NEWARK, N. J.
 VOORHEES, GMELIN & WALKER . . . *Architects and Engineers*
 TURNER CONSTRUCTION CO. *Builders*
 HATZEL & BUEHLER, INC., *Electrical Contractors*



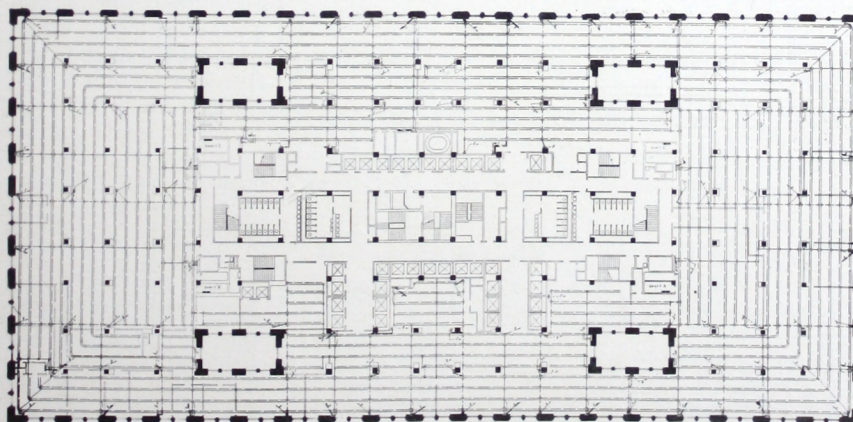
This installation is typical of the Single Grid layout. The plan shown below gives full coverage to all usable space and adequate provision has been made for present and future telephone and miscellaneous wire requirements. This is also a typical installation of closed bottom fibre duct in a monolithic poured floor.



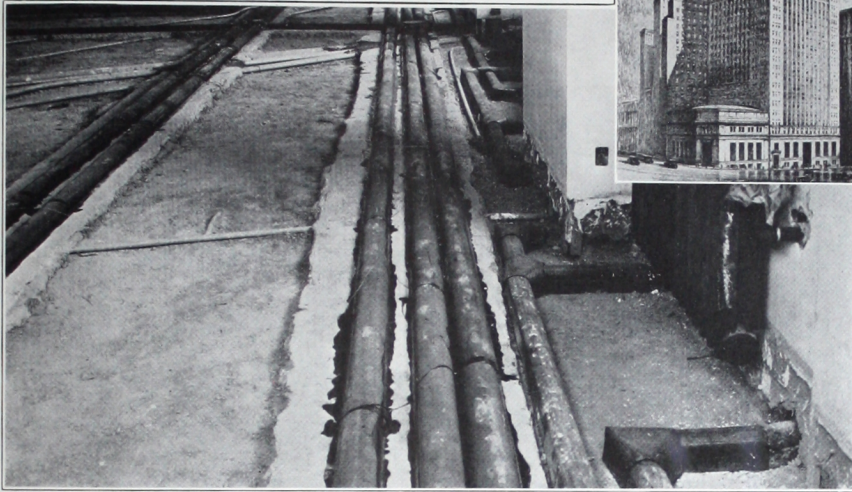
NEW YORK LIFE INSURANCE CO., NEW YORK CITY
 CASS GILBERT, INC. Architect
 STARRETT BROS. Builders
 FISCHBACH & MOORE, INC., *Electrical Engineers and Contractors*



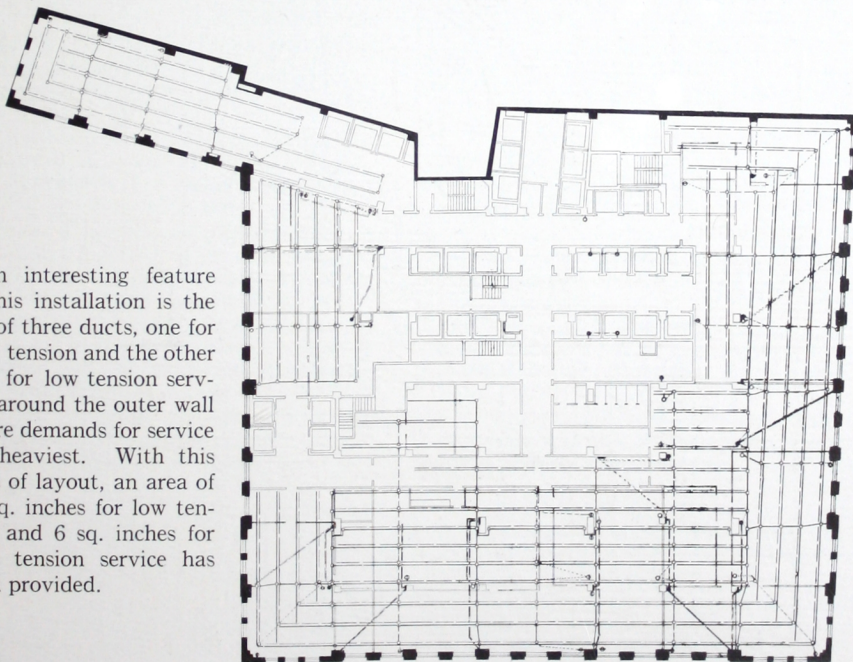
This is a typical installation of an Interlocking Comb layout designed to give maximum coverage to all usable area. By means of large-sized ducts (both the low tension and high tension ducts have 6 sq. inches area) and single compartment boxes for each class of service, sufficient capacity has been provided for any and all wire requirements for the life of the building. Open bottom fibre ducts were used in this installation.



EQUITABLE TRUST CO. - - - - NEW YORK CITY
 TROWBRIDGE & LIVINGSTON Architects
 MEYER, STRONG & JONES Engineers
 THOMPSON-STARRETT Co., Builders and Electrical Contractors



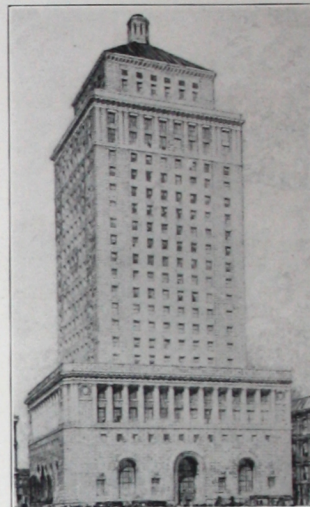
An interesting feature of this installation is the use of three ducts, one for high tension and the other two for low tension service, around the outer wall where demands for service are heaviest. With this type of layout, an area of 12 sq. inches for low tension and 6 sq. inches for high tension service has been provided.



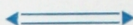


Left—BANK OF N. Y. & TRUST CO., New York. Architect, Benj. W. Morris; Engineer, Meyer, Strong & Jones; Builder, Marc Eidlitz & Son; Electrical Contractor, Watson-Flagg Eng. Co.

Right—ROYAL BANK OF CANADA, Montreal. Architect, York & Sawyer; J. G. Davenport; Engineer, Meyer, Strong & Jones; Builder, Geo. A. Fuller Co.; Electrical Contractor, Canadian Comstock Co.



Representative Installations



BANK AND OFFICE BUILDINGS

AMERICAN RADIATOR CO., New York

Architect, RAYMOND HOOD; Engineer, MEYER, STRONG & JONES; Builder, HEGEMAN-HARRIS CO.; Electrical Contractor, WATSON-FLAGG ENG. CO.

BALDWIN LOCOMOTIVE WORKS, Eddystone, Pa.

Architect, SIMON & SIMON; Engineer, ARCHITECTS; Builder, TURNER CONSTR. CO.; Electrical Contractor, W. V. PANGBORNE & CO.

CITY OF NEW ORLEANS, New Orleans

Architect, J. A. CHRISTY; Engineer, JOHN KLOSER; Builder, CITY; Electrical Contractor, SULLIVAN & PHILLIPS

CITIZENS NATIONAL BANK, Baltimore

Architect, GRAHAM, ANDERSON, PROBST & WHITE; Engineer, ARCHITECT; Builder, GEO. A. FULLER CO.; Electrical Contractor, RIGGS, DISTLER CO., INC.

CONGOLEUM NAIRN CO., Kearny, N. J.

Architect, GUILBERT & BETELLE; Engineer, ARCHITECT; Builder, GEO. A. FULLER CO.; Electrical Contractor, HOWARD P. FOLEY CO.

DREXEL & CO., Philadelphia

Architect, CHAS. Z. KLAUDER; Engineer, MEYER, STRONG & JONES; Builder, DOYLE & CO.; Electrical Contractor, WALKER & KEPLER

FEDERAL RESERVE BANK, Minneapolis

Architect, CASS GILBERT; Engineer, ARCHITECT; Builder, C. F. HANGLIN CO.; Electrical Contractor, L. K. COMSTOCK CO.

FEDERAL RESERVE BANK, New Orleans

Architect, RATHBORNE DE BUYS; Engineer, A. W. LEWIN; Builder, GEO. J. GLOVER CO.; Electrical Contractor, SULLIVAN & PHILLIPS

FEDERAL RESERVE BANK, New York

Architect, YORK & SAWYER; Engineer, MEYER, STRONG & JONES; Builder, MARC EIDLITZ & SON; Electrical Contractor, LORD ELECTRIC CO.

FIRST NATIONAL BANK, Boston

Architect, YORK & SAWYER; Engineer, MEYER, STRONG & JONES; Builder, STONE & WEBSTER; Electrical Contractor, BUILDER

FRANKLIN SAVINGS BANK, New York

Architect, YORK & SAWYER; Engineer, ARCHITECTS; Builder, FOUNTAIN & CHOATE; Electrical Contractor, PEET & POWERS

GREENWICH SAVINGS BANK, New York

Architect, YORK & SAWYER; Engineer, MEYER, STRONG & JONES; Builder, MARC EIDLITZ & SON; Electrical Contractor, A. GUSTAFSON CO.

GUARDIAN DETROIT BANK, Detroit

Architect, SMITH, HINCHMAN & GRYLLS; Engineer, ARCHITECTS; Builder, A. A. ALBRECHT CO.; Electrical Contractor, HATZEL & BUEHLER, INC.

INTERNATIONAL MAGAZINE CO., New York

Architect, GEO. B. POST & SONS; Engineer, MEYER, STRONG & JONES; Builder, J. LOWRY; Electrical Contractor, B. EICHWALD & CO.

JOHNS-MANVILLE CORP., New York

Architect, LUDLOW & PEABODY; Engineer, KAISER, MULLER & DAVIES; Builder, WM. CRAWFORD CO.; Electrical Contractor, A. GUSTAFSON CO.

LEFCOURT NATIONAL BLDG., New York

Architect, SHREVE & LAMB; Engineer, MEYER, STRONG & JONES; Builder, A. E. LEFCOURT; Electrical Contractor, GREER ELECTRIC CO.

MANUFACTURERS & TRADERS BANK, Buffalo

Architect, HALSEY, McCORMACK & HELMER, INC.; Engineer, L. E. EBEN; Builder, ROBT. E. WILLIAMS; Electrical Contractor, ROBERTSON ELEC. CONSTR. CO.

MUNICIPAL BLDG., Brooklyn, N. Y.

Architect, MCKENZIE, VOORHEES & GELIN; Engineer, CLARK, McMULLIN & RILEY; Builder, CAULDWELL-WINGATE CO.; Electrical Contractor, P. J. KEOGAN & CO.

MUNICIPAL BLDG., East Orange, N. J.
Architect, ELY & ELY; Engineer, MEYER, STRONG & JONES; Builder, OWNER; Electrical Contractor, W. KIDDE & Co., INC.

NATIONAL CITY BANK (Wall Str.), New York
Architect, MCKIM, MEAD & WHITE; Engineer, KAISER, MULLER & DAVIES; Builder, OWNER; Electrical Contractor, HARRY ALEXANDER, INC.

NATIONAL CITY BANK (W. 28th St.), New York
Builder, J. H. TAYLOR CONSTR. CO.; Electrical Contractor, LORD ELECTRIC CO.

NEBRASKA STATE CAPITOL, Lincoln, Neb.
Architect, B. W. GOODHUE; Engineer, MEYER, STRONG & JONES; Builder, BATES & ROGERS; Electrical Contractor, W. G. CORNELL CO.

NEW YORK COTTON EXCHANGE, New York
Architect, DONN BARBER; Engineer, PATTISON BROS; Builder, GEO. A. FULLER CO.; Electrical Contractor, LORD ELECTRIC CO.

NEW YORK LIFE INS. CO. (Printing Plant) New York
Architect, NORMAN T. ANTHONY; Engineer, MEYER, STRONG & JONES; Builder, STARRETT BROS; Electrical Contractor, J. LIVINGSTON & Co.

NEW YORK STOCK EXCHANGE ANNEX, New York
Architect, TROWBRIDGE & LIVINGSTON; Engineer, MEYER, STRONG & JONES; Builder, MARC EIDLITZ & SON; Electrical Contractor, RYAN & DIPPELL

RAND BUILDING, Buffalo, N. Y.
Architect, KIDD & KIDD; Engineer, ARCHITECT; Builder, J. W. COWPER CO.; Electrical Contractor, MCCARTHY BROS. & FORD.

SEAMAN'S BANK FOR SAVINGS, New York
Architect, BENJ. W. MORRIS; Engineer, MEYER, STRONG & JONES; Builder, WM. L. CROW CONSTR. CO.; Electrical Contractor, PEET & POWERS

STANDARD OIL CO., New York
Architect, CARRERE & HASTINGS; Engineer, ARCHITECTS; Builder, C. T. WILLS, INC.; Electrical Contractor, HATZEL & BUEHLER, INC.

STATE CAPITOL, Olympia, Wash.
Architect, WILDER & WHITE; Engineer, R. D. KIMBALL & Co.; Builder, PRATT & WATSON; Electrical Contractor, NePAGE MCKINNEY CO.

STATE OFFICE BUILDING, Harrisburg, Pa.
Architect, A. BRUNER & ASSOC.; Engineer, DANIEL, MORAY & WALLEN; Builder, JAMES BAIRD CO.; Electrical Contractor, KEYSTONE ENG. CO.

STEINWAY CO., New York
Architect, WARREN & WETMORE; Engineer, MEYER, STRONG & JONES; Builder, THOMPSON-STARRETT CO.; Electrical Contractor, BUILDER

S. W. STRAUS & CO., Chicago
Architect, GRAHAM, ANDERSON, PROBST & WHITE; Engineer, ARCHITECT; Builder, THOMPSON-STARRETT CO.; Electrical Contractor, L. K. COMSTOCK CO.

WESTERN ELECTRIC CO., New York
Architect, WELLS BOSWORTH; Engineer, MEYER, STRONG & JONES; Builder, MARC EIDLITZ & SON; Electrical Contractor, J. P. HALL-SMITH CO.

10 E. 40TH STREET, New York
Architect, LUDLOW & PEABODY; Engineer, MEYER, STRONG & JONES; Builder, G. RICHARD DAVIS; Electrical Contractor, LORD ELECTRIC CO.

INSURANCE COMPANIES

AETNA INSURANCE CO., Hartford, Conn.
Architect, BENJ. W. MORRIS; Engineer, MEYER, STRONG & JONES; Builder, MARC EIDLITZ & SON; Electrical Contractor, A. GUSTAFSON CO.

CONN. GENERAL LIFE INS. CO., Hartford, Conn.
Architect, JAS. GAMBLE ROGERS; Engineer, KAISER, MULLER & DAVIES; Builder, MARC EIDLITZ & SON; Electrical Contractor, A. GUSTAFSON CO.

CONN. MUTUAL LIFE INS. CO., Hartford, Conn.
Architect, BENJ. W. MORRIS; Engineer, KAISER, MULLER & DAVIES; Builder, HENRY C. IRONS CO.; Electrical Contractor, A. GUSTAFSON CO.

FIREMAN'S INSURANCE CO., Newark, N. J.
Architect, ELY & ELY; Engineer, MEYER, STRONG & JONES; Builder, STARRETT BROS.; Electrical Contractor, BEACH ELECTRIC CO.

GLENS FALLS INSURANCE CO., Glens Falls, N. Y.
Architect, GEO. B. POST & SONS; Engineer, KARR PARKER; Builder, J. J. TURNER CONSTR. CO.; Electrical Contractor, HERLIHY ELEC. CONSTR. CO.

INSURANCE CO. OF NORTH AMERICA, Philadelphia
Architect, STEWARTSON & PAGE; Engineer, STONE & WEBSTER; Builder, ENGINEERS; Electrical Contractor, HATZEL & BUEHLER, INC.

LINCOLN LIFE INSURANCE CO., Fort Wayne, Ind.
Architect, BENJ. W. MORRIS; Engineer, CLYDE R. PLACE; Builder, HEGEMAN-HARRIS CO.; Electrical Contractor, L. K. COMSTOCK CO.

MARYLAND CASUALTY CO., Philadelphia
Architect, WM. STEELE & SONS; Engineer, ARCHITECT; Builder, ARCHITECT; Electrical Contractor, ARCHITECT

MICHIGAN MILLERS MUTUAL INSURANCE CO., Lansing, Mich.
Architect, POND & POND—MARTIN & LLOYD; Engineer, MCCALL, SNYDER & McLAIN; Electrical Contractor, JACKSON ELECTRIC CO.

MUTUAL BENEFIT LIFE INS. CO., Newark, N. J.
Architect, ELY & ELY; Engineer, MEYER, STRONG & JONES; Builder, STARRETT BROS.; Electrical Contractor, FRANK KAUTZMAN

NAT'L LIFE & ACCIDENT CO., Nashville, Tenn.
Architect, GEO. C. NORTON; Engineer, R. D. KIMBALL; Builder, FOSTER & CREIGHTON CO.; Electrical Contractor, RUMSEY ELECTRIC CO.

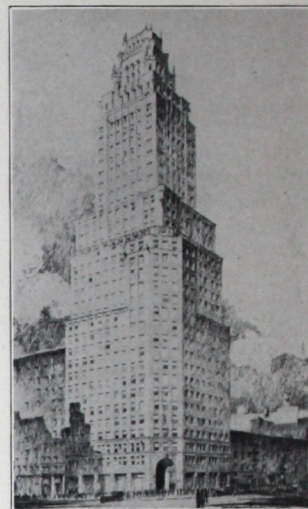
PROVIDENT LIFE INS. CO., Chattanooga, Tenn.
Architect, R. H. HUNT; Engineer, ARCHITECT; Builder, JOHN PARKS CO.; Electrical Contractor, FRED CANTRELL CO.

ROYAL INSURANCE CO., New York
Architect, STARRETT & VAN VLECK; Engineer, ARCHITECTS; Builder, MARC EIDLITZ & SON; Electrical Contractor, WATSON-FLAGG ENG. CO.

SECURITY INSURANCE CO., New Haven, Conn.
Architect, M. K. MURPHY; Engineer, MEYER, STRONG & JONES; Builder, C. T. WILLS, INC.; Electrical Contractor, A. GUSTAFSON CO.



Left—BELL TEL. CO. OF CANADA, Montreal. Architect, Barott & Blockeder; Engineer, McDougall, Pease & Friedman; Builder, Geo. A. Fuller Co.; Electrical Contractor, W. H. Taverner Corp.



Right—INTERNATIONAL TEL. & TEL. CO., New York. Architect, Buchman & Kahn; Engineer, Clark, McMullin & Riley; Builder, A. E. Lefcourt; Electrical Contractor, Lord Electric Co.

PUBLIC UTILITY COMPANIES

AMERICAN TEL. & TEL. CO., New York
Architect, WELLS BOSWORTH; *Engineer*, MEYER, STRONG & JONES; *Builder*, MARC EIDLITZ & SON; *Electrical Contractor*, L. K. COMSTOCK CO.

BELL TELEPHONE LABORATORIES, New York
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, ARCHITECTS; *Builder*, TIDEWATER BLDG. CORP.; *Electrical Contractor*, J. P. HALL-SMITH CO.

BROOKLYN EDISON CO., Brooklyn, N. Y.
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, CLARK, McMULLIN & RILEY; *Builder*, CAULDWELL-WINGATE CO.; *Electrical Contractor*, BRACKETT & COLT

BROOKLYN EDISON CO., Brooklyn, N. Y.
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, ARCHITECTS; *Builder*, CAULDWELL-WINGATE CO.; *Electrical Contractor*, LORD ELECTRIC CO.

CHESAPEAKE & POTOMAC TEL. CO, Washington
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, ARCHITECTS; *Builder*, MARC EIDLITZ & SON; *Electrical Contractor*, SEAL & CO.

IMPERIAL RAILWAY STATION, Osaka, Japan

LONG ISLAND R.R. CO., Morris Park, L. I.
Architect, L. I. R.R. CO.; *Engineer*, ARCHITECT; *Builder*, TURNER CONSTR. CO.; *Electrical Contractor*, HATZEL & BUEHLER, INC.

N. Y. TELEPHONE CO. (Barclay-Vesey Bldg.) New York
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, MEYER, STRONG & JONES; *Builder*, MARC EIDLITZ & SON; *Electrical Contractor*, HATZEL & BUEHLER, INC.

N. Y. TELEPHONE CO., New York
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, ARCHITECTS; *Builder*, TIDEWATER CONTR. CO.; *Electrical Contractor*, A. GUSTAFSON CO.

N. Y. TELEPHONE CO., New York
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, ARCHITECTS; *Builder*, JAS. STEWART CO.; *Electrical Contractor*, A. GUSTAFSON CO.

N. Y. TELEPHONE CO. (175th St. & Walton Ave.) New York
Architect, VOORHEES, GMELIN & WALKER; *Engineer*, ARCHITECTS; *Builder*, EMIL DEBITSCH; *Electrical Contractor*, HATZEL & BUEHLER, INC.

N. Y. TELEPHONE CO., Schenectady
Architect, E. A. MUNGER; *Engineer*, ARCHITECT; *Builder*, GEO. A. GLASS, INC.; *Electrical Contractor*, JAS. F. BURNS ELEC. WORKS

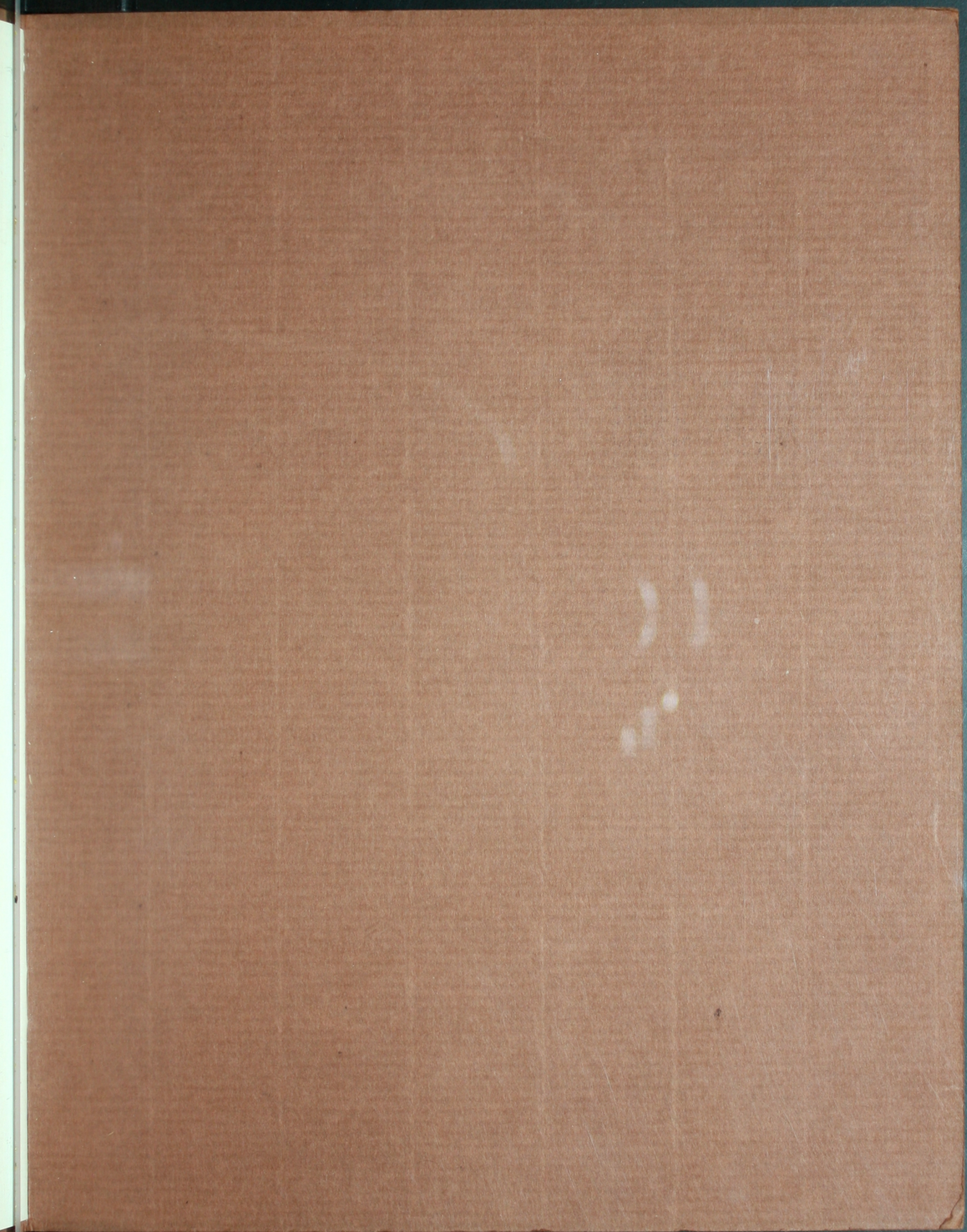
N. Y. TELEPHONE CO., Syracuse, N. Y.
Architect, MCKENZIE, VOORHEES & GMELIN; *Engineer*, ARCHITECTS; *Builder*, WHITE CONSTR. CO.; *Electrical Contractor*, INDUSTRIAL POWER INSTALLATION CO.

NORTHWESTERN BELL TEL. CO., Des Moines, Ia.
Architect, GEORGE PRINZ; *Engineer*, NEILER, RICH & CO.; *Builder*, ARTHUR NEUMAN CO.; *Electrical Contractor*, ELEC. EQUIPMENT CO.

PUBLIC SERVICE CO. OF N. J., Newark, N. J.
Architect, PUBLIC SERVICE PRODUCTION CO.; *Engineer*, ARCHITECTS; *Builder*, ARCHITECTS; *Electrical Contractor*, ARCHITECTS

SAO PAULO TRACTION, LIGHT & POWER CO., LTD., Sao Paulo, Brazil
Architect, E. P. RAMOS DE AZEVEDO & CIA.; *Engineer*, ARCHITECTS;

SOUTHERN NEW ENGLAND TEL. CO., New Haven, Conn.
Architect, L. W. ROBINSON; *Engineer*, ARCHITECT; *Electrical Contractor*, STEVENS & FITCH



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